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10/666,917	09/18/2003	Lifeng Wang	MCS-040-03	6479

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EXAMINER	
PAPPAS, PETER	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/666,917	WANG ET AL.	
	Examiner	Art Unit	
	Peter-Anthony Pappas	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,10-14,16,17,19-26,28 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-14,16,17,19-26,28 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 10, 19, 20-26, 28 and 30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

3. In regard to claims 10, 19 and 20-26 it is noted that the specification discloses "...Computer storage media includes, but is not limited to,...any other medium which can be used to store the desired information and which can be accessed by the computer 210. Communication media...data in a modulated data signal such as a carrier wave..." (p. 10, lines 16-24).

Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in § 101. First, a claimed signal is clearly not a "process" under § 101 because it is not a series of steps. The other three § 101 classes of machine, compositions of matter and manufactures "relate to structural entities and can be grouped as 'product' claims in order to contrast them with process claims." 1 D.

Chisum, Patents § 1.02 (1994). The three product classes have traditionally required physical structure or material.

4. In regard to claims 28 and 30 it appears that said claims, taken as a whole, read on computer listings per se as evidenced by the specification (p. 9, lines 11-24).

Computer programs claimed as computer listings per se, i.e., the descriptions or expressions of the programs, are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zatz et al. (U.S. Patent No. 6, 724, 394 B1) in view of Morgan et al. (U.S. Patent No. 5, 821, 940).

7. In regard to claim 1 it is noted that the respective claim language discloses open-ended language (e.g., "comprising") and as such said claim is not considered to be limited to only the respective limitations disclosed.

Zatz et al. teaches a system and method for processing pixel data in a graphics pipeline (col. 2, lines 59-60), wherein said graphics pipeline includes a transform module which outputs to a lighting module (Fig. 3). It is noted that said pipeline is considered to read on a "transform and lighting module."

Zatz et al. fails to explicitly teach: defining a vertex cache as a software cache located within a transform and lighting module; determining that a first vertex of the rendering data has already been transformed by not lighted and storing the first vertex in the vertex cache such that the first vertex bypasses a transformation module of the transform and lighting module; transforming vertices of the rendering data that have not already been transformed from model space into clip space; and continuing to store vertices of the rendering data that have already been transformed but not lighted in the vertex cache as needed to facilitate a single streamline branched architecture that avoids processing duplication of the vertices.

Morgan et al. teaches a transformation module (Fig. 2, elements 12, 14, 16, 18 and 22) for: defining a vertex cache (Fig. 5 – cache storage means 22); determining that a first vertex of the rendering data has already been transformed and storing the first

vertex in the vertex cache such that the first vertex bypasses a (transformation processor 18) transformation module (col. 3, lines 28-41); transforming vertices of the rendering data that have not already been transformed from model space into clip space (col. 3, lines 23-26); and continuing to store vertices of the rendering data that have already been transformed in the vertex cache as needed to facilitate a single streamline branched architecture that avoids processing duplication of the vertices (col. 3, lines 15-43, specifically lines 38-43).

It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the transformation module taught by Morgan et al. into the system taught by Zatz et al, thereby replacing the transformation module of Zatz et al., because through such incorporation it would provide a means of eliminating redundant transformations resulting in a more efficient system.

Morgan et al. fails to explicitly teach defining said cache storage means 22 as a software cache. It is noted that said respective claim language fails to disclose that said vertex cache is only implemented in software. Official Notice is taken that both the concept and the advantages of controlling computer devices via software (firmware), wherein said software is stored within said devices, are well known and expected in the art. Thus, it would have been obvious to one skilled in the art, at the time of the Applicant's invention, to utilize software to implement, at least in part, said cache storage means as taught by Morgan et al., which includes a cache control device 26, vertex cache memory device 28 and I/O buffer 30 (Fig. 5), because utilizing software to control the operation of a given computer device provides a conventional means for said

device to operate within a given computer system – e.g., by providing a means for said device to communication to other device within said system via respective inputs and outputs of said device.

It is implicitly taught that through said combination vertices of the rendering data that have been transformed but not lighted, as lighting occurs post transformation, would be continued to be stored in the vertex cache.

8. In regard to claim 2 Zatz et al. and Morgan et al. teach determining whether to cull (eliminate the storage of redundant, i.e. non-unique, vertex information) each the vertices prior to lighting the rendering data (Morgan et al. – col. 3, lines 28-43).

9. In regard to claim 3 the rationale disclosed in the rejection of claim 2 is incorporated herein. Morgan et al. illustrates in Fig. 4 storing original vertices and indices to said original vertices for non-original vertices. It is noted that six entries in the table illustrated in Fig. 4 are assigned original vertices while five entries of said table are assigned an index value to a respective original vertex. Thus it is thus noted that five of said eleven vertices are considered to be "discarded" in that said system does not require a vertex, merely a index, to be stored for said five vertices. The motivation disclosed in the rejection of claim 1 is incorporated herein.

10. In regard to claim 4 the rationale disclosed in the rejection of claim 3 is incorporated herein. It is implicitly taught that processing of any vertices not culled is continued.

11. In regard to claim 5 Zatz et al. teaches performing lighting and texture generation post transformation processing (Fig. 3; Fig. 4, specifically texture unit 408), which results in the generation of coordinate information (col. 4, lines 45-58).

12. In regard to claim 10 Zatz et al. teaches computer-readable medium having computer-executable instructions for performing the computer-implement method disclosed in claim 1 (col. 9, lines 49-59; col. 10, lines 15-19). The rationale disclosed in the rejection of claim 1 is incorporated herein.

13. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zatz et al. (U.S. Patent No. 6, 724, 394 B1) and Morgan et al. (U.S. Patent No. 5, 821, 940), as applied to claims 1-5 and 10, in view of Foley et al. (Computer Graphics: Principles and Practice).

14. In regard to claim 6 Zatz et al. and Morgan et al. fail to explicitly teach performing view frustum clipping on the coordinates after the lighting and texture generation and transformation. Foley et al. teaches the use of extents and bounding volumes (e.g., view frustum) for clipping (pp. 237-242, § 6.2; 271-274, § 6.5.3; pp. 660-663, § 15.2.3). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Foley et al. into the system taught by Zatz et al. and Morgan et al., because through such incorporation it would provide a means for reducing the amount of graphics data necessary to be rendered, thus resulting in a quicker and more efficient rendering system. Furthermore, by clipping post processing it would remove the need to re-clip said information as said coordinates have undergone transformation and thus might have changed location.

15. In regard to claim 7 Zatz et al. and Morgan et al. fail to explicitly teach wherein the coordinates are normalized homogenous coordinate system clip space coordinates. Foley et al. teaches the use of a normalized homogenous coordinate system (pp. 204-208, § 5.2; pp. 213-217, §5.6). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Foley et al. into the system taught by Zatz et al. and Morgan et al., because through such incorporation it would provide a conventional system for representing coordinate information and thus would not require specialized hardware or software to implement.

16. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zatz et al. (U.S. Patent No. 6, 724, 394 B1) and Morgan et al. (U.S. Patent No. 5, 821, 940), as applied to claims 1-5 and 10, in view of Wang et al. (U.S. Patent No. 7, 139, 005 B2).

17. In regard to claim 8 Zatz et al. and Morgan et al. fail to explicitly teach the use of Direct3D for mobile. Wang et al. teaches using Direct3D for mobile for rendering computer graphics information (col. 8, lines 11-44). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Wang et al. into the system taught by Zatz et al. and Morgan et al., because though such incorporation it would provide a rendering standard for allowing said graphic information to be presented on a mobile device resulting in said system being able to be more widely utilized (e.g., said system could be implemented on a mobile computing device).

18. Claims 13, 14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanaswami (U.S. Patent No. 5, 555, 355), as applied to claims 11, 12 and 19, in view of Foley et al. (Computer Graphics: Principles and Practice).

19. In regard to claim 13 Narayanaswami fails to explicitly teach determining that the culled transformed vertex forms a back face of a triangle. Foley et al. teaches the concept of back-face culling, wherein it is determined whether a polygon is back-facing. Foley et al. teaches eliminating edges that are determined to be back-facing for a respective polygon (pp. 663-664, § 15.2.4; p. 663, Fig. 15.17). It is noted that a polygon (e.g., a triangle) is considered to be defined by respective edges and vertices. It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of Foley et al. into the system taught by Narayanaswami, because through such incorporation it would provide a means for reducing the amount of graphics data necessary to be rendered, resulting in a quicker and more efficient rendering system.

20. In regard to claim 14 the rationale disclosed in the rejection of claim 13 is incorporated herein. It is noted that the removal of an edge is considered to read on the removal of said edge's respective vertices.

21. In regard to claim 16 Narayanaswami fails to explicitly teach determining that the culled transformed vertex is outside of one view frustum clip plane. Foley et al. teaches the use of extents and bounding volumes (e.g., view frustum) for clipping (pp. 237-242, § 6.2; 271-274, § 6.5.3; pp. 660-663, § 15.2.3). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the teachings of

Foley et al. into the system taught by Baker et al., because through such incorporation it would provide a means for reducing the amount of graphics data necessary to be rendered, resulting in a quicker and more efficient rendering system.

22. In regard to claim 17 Foley et al. teaches that limiting the view volume can be useful in order to eliminate extraneous objects (p. 240). It is noted that the removal of an object (e.g., triangle) is considered to read on the removal of said triangle's respective vertices. The rationale disclosed in the rejection of claim 16 is incorporated herein.

23. Claims 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zatz et al. (U.S. Patent No. 6, 724, 394 B1) in view of Morgan et al. (U.S. Patent No. 5, 821, 940) in view of Foley et al. (Computer Graphics: Principles and Practice) and further in view of Kaufman (U.S. Patent No. 4, 987, 554).

24. In regard to claim 20 Zatz et al. teaches that inputting 3D data, containing vertices, for further processing wherein the result of said processing is the display of said data in 2D is well known (col. 1, lines 51-58). The rationale disclosed in the rejection of claims 1, 6 and 7 is incorporated herein.

Zatz et al., Morgan et al. and Foley et al. fail to explicitly teach the use of fixed-point vertices. Kaufman teaches the use of fixed-point vertices (col. 20, lines 36-40). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate the use of fixed-point vertices into the system taught by Zatz et al., Morgan et al. and Foley et al., because processing fixed-point vertices are more

computationally efficient then processing floating-point vertices and thus would result in a more efficient system (Kaufman – col. 20, lines 36-40).

25. In regard to claim 21 the rationale disclosed in the rejection of claims 13 and 14 is incorporated herein.

26. In regard to claim 22 the rationale disclosed in the rejection of claim 21 is incorporated herein. It is noted that culled information is considered to be discarded.

27. In regard to claim 23 the rationale disclosed in the rejection of claims 16 and 17 is incorporated herein.

28. In regard to claim 24 the rationale disclosed in the rejection of claim 23 is incorporated herein. It is noted that culled information is considered to be discarded.

29. In regard to claim 25 the rationale disclosed in the rejection of claim 23 is incorporated herein (Morgan et al. – col. 4, lines 11-13; Fig. 5, element 22; Fig. 6, element 22).

30. In regard to claim 26 the rationale disclosed in the rejection of claim 6 is incorporated herein.

31. Claims 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zatz et al. (U.S. Patent No. 6, 724, 394 B1) in view of Morgan et al. (U.S. Patent No. 5, 821, 940) in view of Foley et al. (Computer Graphics: Principles and Practice) in view of Kaufman (U.S. Patent No. 4, 987, 554) and further in view of Narayanaswami (U.S. Patent No. 5, 555, 355).

32. In regard to claim 28 the rationale disclosed in the rejection of claims 1, 5, 6 and 7 is incorporated herein. Zatz et al., Morgan et al., Foley et al. and Kaufman fail to

explicitly teach a culling module position after the transformation module and before the lighting module.

Narayanaswami teaches a culling module positioned after the transformation module and before the lighting module (Fig. 2). It would have been obvious to one skilled in the art, at the time of the Applicant's invention, to incorporate a culling module positioned after the transformation module and before the lighting module, as taught by Narayanaswami, into the system taught by Zatz et al., Morgan et al., Foley et al. and Kaufman, because through such incorporation it would eliminate portions of data that are not visible for display (col. 3, lines 14-16), thus removing the need to process unnecessary data any further and resulting in a more efficient system.

33. In regard to claim 30 the rationale disclosed in the rejection of claim 7 is incorporated herein.

Claim Rejections - 35 USC § 102

34. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

35. Claims 11, 12 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Narayanaswami (U.S. Patent No. 5, 555, 355).

36. In regard to claim 11 Narayanaswami teaches a system for efficiently clamping lighted color vertex data without using processor branch instructions (Abstract). Narayanaswami implicitly teaches inputting rendering data in model space containing

vertices (col. 3, lines 12-14; Fig. 2, element 202). Narayanaswami teaches: transforming vertices in the rendering data from model space to clip space to generated transformed vertices (c col. 3, lines 12-14; Fig. 2, element 202); culling a transformed vertex prior to processing by a lighting module after determining that the transformed vertex is not needed (Fig. 2, element 204); lighting each of the transformed vertices using the lighting module (Fig. 2, element 206), except for the transformed vertex, to computer color and generated transformed and lighted vertices (col. 3, lines 14-19; Fig. 2). It is noted said system is considered to perform the process.

37. In regard to claim 12 Narayanaswami teaches that lighting calculations performed for each vertex result in the computation of color for said vertex. Narayanaswami further teaches that said color values are further processed via clamping (col. 3, lines 16-21, 34-41). It is implicitly taught that each of said transformed vertices are examined to determine whether they have previously been lighted. As illustrated in Fig. 3 clamping is broken down into at least three steps (e.g., clamping of red, green and blue) and considered to be performed sequentially (Fig. 3, elements 3406, 308 and 10). In another words the clamping of G (determination that the clamping of R has been performed and wherein lighting information is further processed) is performed after the clamping of R.

38. In regard to claim 19 Narayanaswami teaches computer-readable media having computer-readable instructions thereon which, when executed by a processor cause said processor to implement the process of claim 11 (col. 14, lines 15-34; Fig. 1). The rationale disclosed in the rejection of claim 11 is incorporated herein.

Response to Arguments

39. The prior 35 U.S.C. 112 second paragraph rejection has been withdrawn in lieu of Applicant's remarks.

40. In response to Applicant's remarks in regard to the prior 35 U.S.C 101 rejection Applicant's remarks have been considered but are not deemed persuasive. Applicant is directed to the respective 35 U.S.C 101 rejection disclosed above.

41. Applicant's remarks in regard to the previously applied prior art have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 571-272-7646. The examiner can normally be reached on M-F 9:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Peter-Anthony Pappas
Examiner
Art Unit 2628

PP